

CLAIMS

1. A method for providing RTCP feedback messages for data packets of at least one streaming session from a client (101) to a streaming server (100), wherein the at least one streaming session is provided using a RTP protocol and the RTCP protocol, and wherein a RTCP bandwidth, being a fraction of the available streaming session bandwidth, is allocated to said RTCP feedback messages, the method comprising the steps of:

receiving session description information at the client (101), wherein the session description information is indicative of the RTCP bandwidth for said RTCP feedback messages, a minimum number of retransmissions to be enabled within said client buffering time, a minimum reporting redundancy for lost data packets of said at least one streaming session and said client buffering time,

determining (401, 402, 403) the maximum number of retransmissions for a data packet based on said client buffering time and a RTCP report interval, wherein the RTCP report interval depends on an average RTCP feedback message size and the RTCP bandwidth allocated to the client (101),

determining (404) whether the maximum number of retransmissions is larger than or equal to said minimum number of retransmissions,

if so:

adding (406) a number of General NACK report blocks to a RTCP feedback packet for requesting the retransmission of lost data packets, wherein the number of General NACK report blocks added to the RTCP feedback packet enables said minimum number of retransmissions of said lost data packets within said client buffering time,

determining (409) the maximum RTCP feedback message size that is allowable under consideration of the allocated RTCP bandwidth, the client buffering time and said minimum number of retransmissions,

determining (402) an resulting average RTCP feedback message size based on the average size of previously sent RTCP feedback message and the size of the RTCP packet comprising said number of General NACK report blocks,

adding (505, 510) a number of Loss RLE report blocks to said RTCP feedback packet for reporting on said lost data packets, if the size of the resulting RTCP feedback packet does not exceed said maximum RTCP feedback message size, and

transmitting (506) the RTCP feedback packet as an RTCP feedback message from the client (101) to the streaming server (100).

2. The method according to claim 1, wherein said number of Loss RLE report blocks is run-length encoded (502) prior to determining, if the size of the resulting RTCP feedback packet including the run-length encoded Loss RLE report blocks does not exceed said maximum RTCP feedback message size.
3. The method according to claim 1 or 2, wherein the method further comprises the step of reducing the minimum reporting redundancy configured by the session description information by the client.
4. The method according to claim 3, further comprising the step of determining (602) the uplink quality of service that is provided for packets of said streaming session and

wherein the minimum reporting redundancy is reduced, if said determined quality of service is above a predetermined threshold level.
5. The method according to claim 3 or 4, wherein the reporting redundancy is reduced by the client by reducing the size of said number of Loss RLE report blocks.
6. The method according to one of claims 3 to 5, wherein the data of the streaming session comprises a basic data layer providing a basic streaming media quality and at least one enhancement layer enhancing the basic streaming media quality,

wherein the step of reducing size of said number of Loss RLE report blocks comprises including only information related to data packets that comprise data of said basic data layer to within said Loss RLE report blocks.

7. The method according to claim 6, wherein the data of the at least one streaming session is an MPEG stream and the basic data layer comprises I-frames and the at least one enhancement layer comprises P-frames and/or B-frames.
8. The method according to claim 6 or 7, the method further comprising the step of determining whether a lost data packet comprises data of the basic data layer based on data packets already received at the client.
9. The method according to one of claims 3 to 8, wherein the size of said number of Loss RLE report blocks is reduced by thinning (603).
10. The method according to one of claims 3 to 8, wherein the size of said number of Loss RLE report blocks is reduced by reducing (507, 508, 509, 511) said number of Loss RLE report blocks being reported in said RTCP feedback packet.
11. The method according to claim 1 or 2, wherein the number of Loss RLE report blocks to be added to said RTCP feedback packet enables said minimum reporting redundancy of said lost packets.
12. The method according to one of claims 1 to 11, wherein a MIME type parameter of the streamed session indicates the packet rate.
13. The method according to one of claims 1 to 12, further comprising the step of determining which data packets of said at least one streaming session are lost based on sequence numbers of data packets received at the client.
14. A method for providing RTCP feedback messages for data packets of at least one streaming session from a client (101) to a streaming server (100), wherein the at least one streaming session is provided using a RTP protocol and the RTCP protocol, the method comprising the steps of:

determining, if the maximum number of retransmissions for a data packet that is providable within session constraints of the streaming session is larger than a minimum number of retransmissions to be enabled by the client,

if so, adding a number of General NACK report blocks to a RTCP feedback packet for requesting the retransmission of lost data packets, wherein the number of General NACK report blocks added to the RTCP feedback packet enables said minimum number of retransmissions of said lost data packets within a client buffering time,

determining the maximum RTCP feedback message size that is allowable in view of said session constraints,

adding a number of Loss RLE report blocks to said RTCP feedback packet for reporting on lost and received data packets, such that size of the resulting RTCP feedback packet does not exceed said maximum RTCP feedback message size, and

transmitting the RTCP feedback packet as an RTCP feedback message from the client (101) to the streaming server (100).

15. The method according to claim 14, further comprising the steps calculating a payload margin in the RTCP feedback packet based on the size of the determined maximum RTCP feedback message size and the size of the General NACK report blocks and

determining the number of Loss RLE report blocks fitting into that payload margin to ensure that the resulting RTCP feedback packet does not exceed said maximum RTCP feedback message size when adding said number of Loss RLE report blocks to said RTCP feedback packet.

16. A client in a mobile communication system transmitting RTCP feedback messages for data packets of at least one streaming session from a client to a streaming server, wherein the at least one streaming session is provided using a RTP protocol and the RTCP protocol, and wherein a RTCP bandwidth, being a fraction of the available streaming session bandwidth, is allocated to said RTCP feedback messages, the client comprising:

a receiver for receiving session description information, wherein the session description information is indicative of the RTCP bandwidth for said RTCP feedback messages, a minimum number of retransmissions to be enabled within said client buffering time, a minimum reporting redundancy for lost data packets of said at least one streaming session and said client buffering time,

processing means for determining (401, 402, 403) the maximum number of retransmissions for a data packet based on said client buffering time and a RTCP report interval, wherein the RTCP report interval depends on an average RTCP feedback message size and the RTCP bandwidth allocated to the client (101), and for determining (404) whether the maximum number of retransmissions is larger than or equal to said minimum number of retransmissions,

wherein the processing means is further adapted to

add (406) a number of General NACK report blocks to a RTCP feedback packet for requesting the retransmission of lost data packets, wherein the number of General NACK report blocks added to the RTCP feedback packet enables said minimum number of retransmissions of said lost data packets within said client buffering time,

to determine (409) the maximum RTCP feedback message size that is allowable under consideration of the allocated RTCP bandwidth, the client buffering time and said minimum number of retransmissions,

to determine (402) an resulting average RTCP feedback message size based on the average size of previously sent RTCP feedback message and the size of the RTCP packet comprising said number of General NACK report blocks, and

to add (505, 510) a number of Loss RLE report blocks to said RTCP feedback packet for reporting on said lost data packets, if the size of the resulting RTCP feedback packet does not exceed said maximum RTCP feedback message size,

if the maximum number of retransmissions is larger than or equal to said minimum number of retransmissions

and the client (101) further comprises a transmitter for transmitting (506) the RTCP feedback packet as an RTCP feedback message to the streaming server (100).

17. The client according to claim 16, further comprising means adapted to perform the method according to one of claims 2 to 13.

18. A computer readable medium for storing instruction that, when executed by a processor of a client in a mobile communication system, cause the client to provide RTCP feedback messages for data packets of at least one streaming session from a client (101) to a streaming server (100), wherein the at least one streaming session is provided using a RTP protocol and the RTCP protocol, and wherein a RTCP bandwidth, being a fraction of the available streaming session bandwidth, is allocated to said RTCP feedback messages, by:

receiving session description information at the client (101), wherein the session description information is indicative of the RTCP bandwidth for said RTCP feedback messages, a minimum number of retransmissions to be enabled within said client buffering time, a minimum reporting redundancy for lost data packets of said at least one streaming session and said client buffering time,

determining (401, 402, 403) the maximum number of retransmissions for a data packet based on said client buffering time and a RTCP report interval, wherein the RTCP report interval depends on an average RTCP feedback message size and the RTCP bandwidth allocated to the client (101),

determining (404) whether the maximum number of retransmissions is larger than or equal to said minimum number of retransmissions,

if so:

adding (406) a number of General NACK report blocks to a RTCP feedback packet for requesting the retransmission of lost data packets, wherein the number of General NACK report blocks added to the RTCP feedback packet enables said minimum number of retransmissions of said lost data packets within said client buffering time,

determining (409) the maximum RTCP feedback message size that is allowable under consideration of the allocated RTCP bandwidth, the client buffering time and said minimum number of retransmissions,

determining (402) an resulting average RTCP feedback message size based on the average size of previously sent RTCP feedback message and the size of the RTCP packet comprising said number of General NACK report blocks,

adding (505, 510) a number of Loss RLE report blocks to said RTCP feedback packet for reporting on said lost data packets, if the size of the resulting RTCP feedback packet does not exceed said maximum RTCP feedback message size, and

transmitting (506) the RTCP feedback packet as an RTCP feedback message from the client (101) to the streaming server (100).

19. The computer readable medium according to claim 18, further storing instructions that, when executed by the processor of the client, cause the client to perform the method according to one of claims 2 to 13.
20. A system comprising a streaming server providing at least streaming session to a client, wherein the at least one streaming session is provided using a RTP protocol and the RTCP protocol, and a client according to claim 16 or 17.